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10/565,104	01/19/2006	Hiroki Maeda	2006_0043A	5520
513 7590 03/31/2008 WENDEROTH, LIND & PONACK, L.L.P. 2033 K STREET N. W. SUITE 800 WASHINGTON, DC 20006-1021				
EXAMINER				
EOFF, ANCA				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/565,104

Applicant(s)

MAEDA ET AL.

Examiner

ANCA EOOF

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/12/2007, 02/07/2008 and 03/21/2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-11 and 13-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-11 and 13-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 03/21/2008.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. The certified English translation of the foreign priority document JP 2003-093624 filed on March 26, 2004 was received and acknowledged.
2. Claims 9-11 and 13-18 are pending in the application. Claims 1-8 and 12 are canceled.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

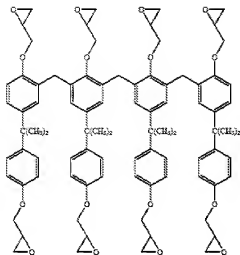
(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 9-10, 13, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US Patent 6,391,523) in view of Ohkawa et al. (US Patent 6,368,769) and in further view of Kamabuchi et al. (US Pg-Pub 2003/0148211).

With regard to claim 9, Hurditch et al. disclose a composition for negative resist comprising:

a) at least one particular polyfunctional epoxy resin which is capable of undergoing ring-opening polymerization under the influence of a strong acid catalyst (column 4, lines 1-3), such as a glycidyl ether of the novolac condensation product of bisphenol A and formaldehyde of formula (I):

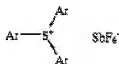
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(I), (column 4)

The compound of formula (I) is equivalent to the multi-functional bisphenol A novolak epoxy resin of formula (3) in the instant application, when R_1 to R_6 are $-\text{CH}_3$ groups and $n=2$.

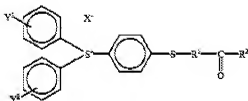
b) at least one photoacid which releases strong acid under the influence of ultraviolet light (column 4, lines 4-5), such as a triarylsulfonium salt of formula (II):



(II), where Ar represents a mixture of aryl groups (column 4, lines 50-64).

However, Hurditch et al. do not disclose a substituted triarylsulfonium salt, such as the sulfonium salt of formula (1) of the instant application.

Ohkawa et al. disclose a resin composition comprising a cationically polymerizing organic substance and a photoacid generator (column 4, lines 26-29), wherein the photoacid is a sulfonium salt having the formula (III):



(III) (formula (1) in column 4, lines 1-10), wherein R¹ is a p-phenylene group in which one or more hydrogen atoms are substituted by halogen or alkyl group, R² is a hydrocarbon radical, in which oxygen or halogen may be contained, Y¹ and Y² are identical or different, respectively hydrogen, halogen or oxygen, or a hydrocarbon radical and X is a monovalent anion (column 4, lines 12-18).

A specific example of sulfonium salt of formula (III) is 4-(2-chloro-4-benzoylphenylthio)phenylbis(4-fluorophenyl)sulfonium hexafluoroantimonate (column 6, lines 5-6), which meets the limitation for the sulfonium salt of formula (1) of the instant application, wherein X₁ and X₂ are fluorine atoms and Y is a chlorine atom.

Okawa et al. further disclose that the cationically polymerizing organic substance may be a polyglycidyl ether of a polyhydric phenol, such as bisphenol A (column 8, lines 62-64).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the sulfonium salt of Ohkawa et al. for the composition for negative resist of Hurditch et al., since Ohkawa et al. teach the use of the sulfonium salt for cationically polymerizable compositions comprising epoxy resins.

Ohkawa et al. further disclose that the resin composition comprising the cationically polymerizing organic substance and the photoacid generator (column 4, lines 26-29) may further comprise a photosensitizer, such as an anthracene derivative (column 11, line 27).

However, Hurditch and Ohkawa fail to disclose a photosensitizer such as naphthol.

Kamabuchi et al. disclose a chemically amplified resist composition comprising a triarylammonium salt as photoacid generator and a sensitizer (abstract). Specific examples of sensitizers are anthracene derivatives and naphthalene derivatives, such as 1-naphthol (par.0088).

Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to include a 1-naphthol sensitizer in the composition of Hurditch modified by Ohkawa, since a 1-naphthol sensitizer is functionally equivalent to the anthracene derivative sensitizer of Ohkawa, as taught by Kamabuchi et al (par.0088).

With regard to claim 10, Ohkawa et al. disclose 4-(2-chloro-4-benzoylphenylthio)phenylbis(4-fluorophenyl)sulfonium hexafluoroantimonate (column 6, lines 5-6), which is identical to the compound of formula (2) of the instant application.

With regard to claim 13, Hurditch et al. disclose that γ -butyrolactone is selected as solvent for the resins of formula (II), commercially sold as SU-8 epoxy resin because of its high solvency of the SU-8 resin and because it is non-flammable (column 2, lines 39-41). Hurditch et al. specifically disclose a composition comprising γ -butyrolactone as solvent (column 9, lines 9-10).

With regard to claim 15, Hurditch et al. disclose a method of forming a pattern having the following steps:

- dissolving the polyfunctional epoxy bis-phenol A novolak resin, the photoacid generator and the other additives in the selected solvent (column 5, lines 19-21) and spin-coating the solution onto a substrate to form a uniform film (column 5, lines 31-32);
- performing a baking step to evaporate the solvent (column 5, lines 47-48);
- photoimaging the solid photoresist coating using an exposure tool (column 5, lines 50-51);
- developing the coating in an organic solvent developer in order to dissolve away the unpolymerized regions (column 5, lines 60-62);
- performing a post-bake step of the resulting image to fully harden the material (column 5, lines 66-67).

With regard to claim 17, Hurditch et al. further disclose that the content of resin of formula (II) is about 90 mass % based on the total solid content of the photosensitive composition (comparative example 2, column 8).

5. Claims 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US Patent 6,391,523) in view of Ohkawa et al. (US Patent 6,368,769) and Kamabuchi et al. (US Pg-Pub 2003/0148211) as applied to claim 9 above and in further view of Williamson et al. (WO 03/018663).

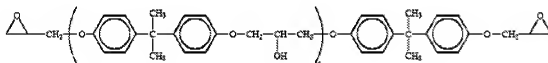
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With regard to claim 11, Hurditch modified by Ohkawa and Kamabuchi disclose the composition of claim 9 above (see paragraph 4 of the Office Action) but fail to disclose a linear polymeric 2-functional epoxy resin.

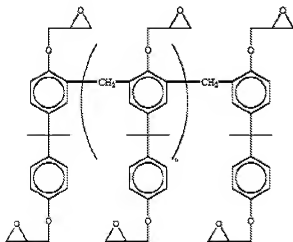
Williamson et al. disclose a composition with applications as coatings and photoresists, said composition comprising a cationic initiator system (abstract).

The initiator may be a sulfonium salt, such as a diphenyl phenylthiophenyl sulfonium salt (page 13, line 5).

Among the polymerizable materials used for the composition, Williamson et al. disclose diglycidyl ethers of bisphenol A represented by the formula (IV):



bisphenol A epoxy novolacs represented by the formula:



and mixtures thereof (page 17, lines 10-15).

The photoinitiator (diphenyl phenylthiophenyl sulfonium salt) and the bisphenol A epoxy novolac resin of Williamson et al. are equivalent to the components of the composition of modified Hurditch.

Based on Williamson's teachings that the diglycidyl ethers of bisphenol A may be used in combination with a bisphenol A epoxy novolac resin in a photoresist composition, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the diglycidyl ethers of bisphenol A in the composition of modified Hurditch, with a reasonable expectation of success.

The diglycidyl ethers of bisphenol A represented by the formula (IV) are equivalent to the compound of claim 18 of the instant application.

6. Claims 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hurditch et al. (US Patent 6,391,523) in view of Ohkawa et al. (US Patent 6,368,769) and Kamabuchi et al. (US Pg-Pub 2003/0148211) as applied to claim 9 above and in further view of Zweifel et al. (US Patent 4,624,912).

With regard to claim 14, Hurditch modified by Ohkawa and Kamabuchi disclose the composition of claim 9 above (see paragraph 4 of the Office Action) but fail to disclose a laminate comprising said composition.

Zweifel et al. disclose that solid epoxy resin comprising a radiation-sensitive photoinitiator are suitable as photosensitive layers which can be transferred easily from a support to a substrate (column 1, lines 56-60). The epoxy resins can be glycidyl ethers of novolaks of substituted or unsubstituted phenols (column 2, lines 10-11), the

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photoinitiators may be cationic compounds, such as aromatic onium salts (column 3, line 57-column 4, line 9) and a sensitizer, such as 2-naphthol (column 8, line 49) may be added.

Based on the fact that the compositions of modified Hurditch and Zweifel are equivalent, it would have been obvious to use the composition comprising a multi-functional bisphenol A novolak epoxy resin, a sulfonium photoinitiator and a sensitizer of modified Hurditch for the photosensitive layer of Zweifel et al.

Zweifel et al. further disclose that the composition is applied to a support (column 9, line 27) and the photosensitive layer present of the support may be protected by a covering film (column 9, lines 40-41), equivalent to the protective film of the instant application.

With regard to claim 16, Zweifel et al. further disclose that the radiation sensitive layer is transferred from the support to the substrate after removal of the covering film (column 9, lines 55-57) and it is modified by irradiation (column 9, lines 63-64). Developing is then performed with organic solvents in which the epoxy resin is soluble (column 10, lines 30-31).

Response to Arguments

7. The Declaration filed on February 07, 2008 under 37 CFR 1.131 is sufficient to overcome the Weber reference.
8. Applicant's arguments filed on December 21, 2007 have been considered but are moot in view of the new grounds of rejection.

On pages 8-12 of the Remarks, the applicant shows how the new amended claims overcome the prior art rejections formulated in the previous Office Action. However, new grounds of rejection are shown above.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anca Eoff whose telephone number is 571-272-9810. The examiner can normally be reached on Monday-Friday, 6:30 AM-4:00 PM, EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anca Eoff/
Examiner, Art Unit 1795

/Cynthia H Kelly/
Supervisory Patent Examiner, Art Unit 1795